

WHAT IS CLAIMED IS:

1. In a cantilever-based instrument having oscillation means to cycle the base position of the cantilever and measure its velocity, optical detection means to sense deflection of the cantilever and computer software means for calculating power spectra from the optical detection means, a method for determining the derivative of the change in cantilever deflection with respect to change in the z position of the cantilever tip without making contact with a surface, including the following steps:

cycling the base position of the cantilever while measuring its velocity,

measuring cantilever deflection with the optical detection means,

calculating the resonant frequency and quality factor of the cantilever from its power spectrum with computer software means,

combining such measurements and calculations in the relationship:

$$InvOLS_{hyst} = \frac{Kv}{\omega_0 Q \Delta V} .$$